OWNER AND INSTALLATION MANUAL
FOR
COMPAC 12
SWIMMING POOL HEAT PUMP

(SD636651 Iss.3 09/03/11)

Health and Safety Warning:
As the heat pump includes electrical and rotational components it is required that only trained and competent persons should remove panels giving internal access to the unit.

Installation Manual ***Compac 12***

TThank you for choosing a Compac Heat Pump!

Your Compac heat pump has been specially designed for pool heating using high quality components, carefully chosen to provide maximum efficiency and reliability. Please read this manual carefully as it provides useful operation and maintenance information that will maximise the benefits your Compac heat pump can offer.

To register your product and for further useful information please visit www.compacheatpumps.co.uk

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1.0 Introduction

The Compac 12 air/water heat pump is designed for swimming pool heating. The heat pump is designed to heat pool water and spas within the range of 15°C to 35°C, and is suitable for outdoor pools operating in ambient temperatures above 5ºC.
The water heat exchanger is a full flow type, manufactured from titanium tube, which is a highly corrosion resistant material. The heat pump is suitable for use in fresh water and salt water pools. The heat pump is fitted with a rotary compressor known for quiet running.
A 3 minute cycle time delay is incorporated for compressor protection. With these features the heat pump is designed to have a long, trouble free life.

All units have integral safety devices to protect the heat pump from internal and external faults. Indicator lamps indicate operating mode. An adjustable digital thermostat controls the water temperature.

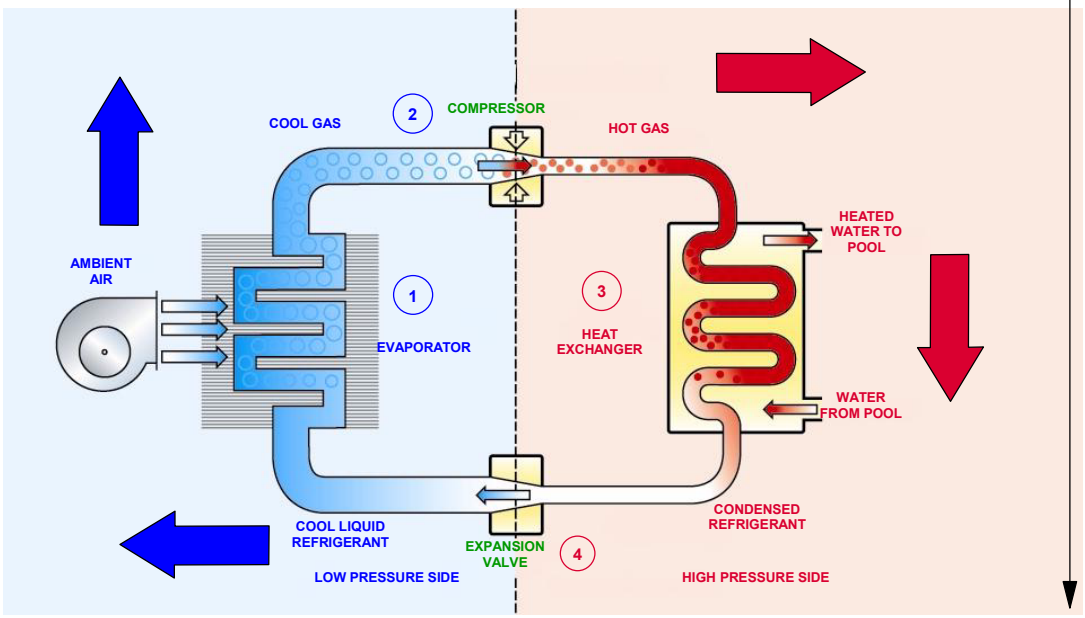
1.1 Function

The swimming pool heat pump provides thermodynamic heating by means of a vapour compression cycle, (similar to that employed in a conventional refrigerator), in addition to acting as an active solar collector.

1. THE EVAPORATOR collects the heat from the outside ambient air, pre-heated by the sun. In the swimming pool heat pumps, high volumes of outside air are drawn into the unit by the fan and expelled through the evaporator fins. The evaporator has liquid refrigerant passing through it, which is at a considerably lower temperature than the ambient air, therefore the air gives up its heat to the refrigerant which then vaporises.This preheated vapour now travels to -

2. THE COMPRESSOR where it is compressed and upgraded to a much higher temperature. The hot vapour now enters -

THE HEAT PUMP CYCLE



4. THE EXPANSION DEVICE and from there, now at normal pressure, it is returned to the evaporator and the cycle starts again.

3. THE CONDENSER where it is surrounded by the pool water. The heat is given up to the cooler pool water and the now cooler refrigerant returns to its former liquid state but still under high pressure from the compressor.
This pressure is released by passing the liquid through -

Coefficient of Performance

The efficiency of a Heat Pump is usually called its 'Coefficient of Performance' - (C.O.P.) which is simply a ratio of heat output to energy input, both being expressed in kW. Thus a Heat Pump absorbing 1 kW of electricity, collecting 4 kW of energy from the air, and delivering 5 kW of heat to the pool water is said to have a C.O.P. of 5:1.

This ratio will vary according to the temperature of the water and the ambient air.

2.0 Installation

a) Ensure that the heat pump on site is as ordered, i.e. model, electrical supply and factory fitted options.

b) Inspect the unit for damage, in particular inspect the evaporator (finned side) to ensure that it is undamaged. (Minor indentations in the fins do not affect performance). If severely damaged, endorse the delivery note in presence of the driver and send a recorded delivery letter to the transport company giving details.

c) Protect the unit if installation is delayed.

2.1 Siting

a) Provide a firm level base capable of supporting the weight of the unit; spread the load if mounted on timber floor.

b) Ensure that water cannot collect under unit, it is recommended that units are installed on plinths 100mm above finished floor level. This also aids condensate drainage.

c) Please allow adequate clearance to service panels on the unit; recommended 500mm minimum.

d) The heat pumps are by design as quiet as is practical, however due consideration should be given to siting the heat pump in order to minimise theeffect of noise coming from the machine, for example by positioning the machine so that the inlet/outlets are parallel to occupied premises.

e) Ensure loose debris such as leaves, grass cuttings, etc will not block air inlet grilles.

f) Consider protection from extreme weather conditions if installed externally, i.e. lean-to-cover or building.

g) Use the antivibration feet provided, not only does this help to reduce noise but it also will help prevent corrosion to the base of the heat pump. Use of stainless steel fixings is recommended.

2.2 Air flow

Due consideration must be given to air flow i.e. do not obstruct either the inlet or outlet and ensure that the discharge to air cannot recirculate to inlet. (See below).

POSSIBLE POSITIONS OF A HEAT PUMP

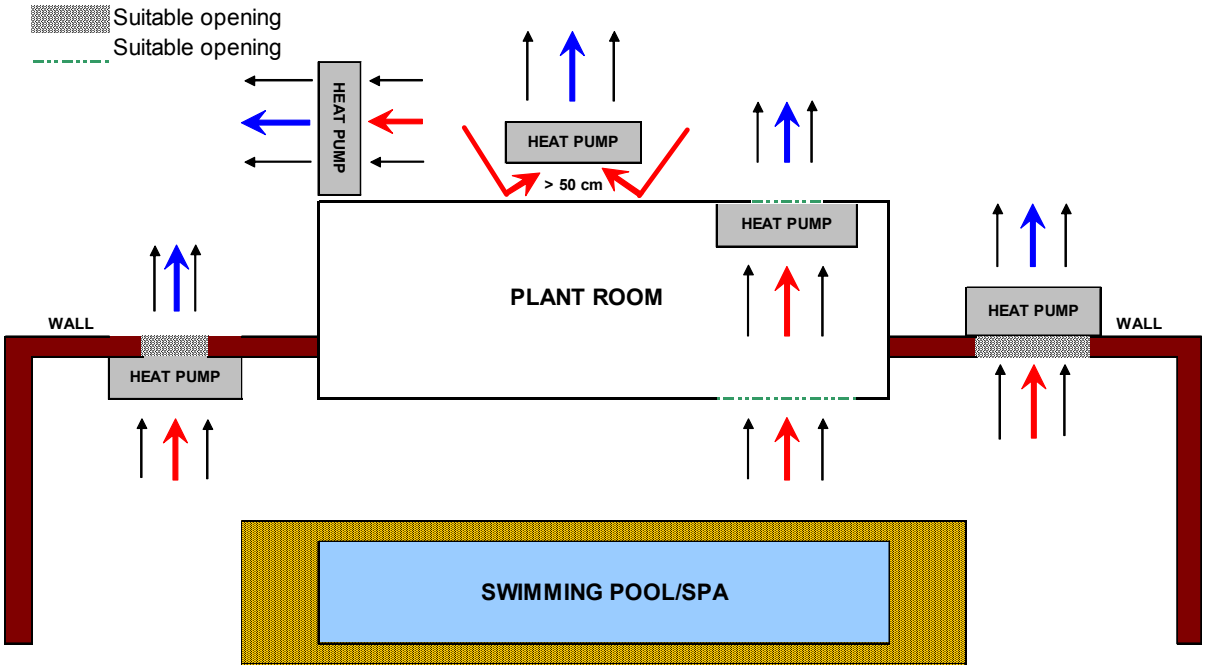


TABLE 1
Minimum Free Area m²

Inlet	Discharge
0.21	0.145

Required Free Areas to provide air flow to and from heat pumps when installed in an enclosed area or where required to pass air through a wall etc.

Free area is the available area through which air can pass through a grille or louvres.

IMPORTANT

If multiple units are installed in an enclosed area then the inlet free areas required for each unit can be added together to form one inlet aperture. BUT the discharge from each unit must be kept separate and must not be incorporated into one common duct system.

3.0 Plumbing

a) The heat pump has water inlet/outlet connections as follows:

The heat pump can be connected to either 1 1/2” or 50mm plastic pipe.

b) The Heat Pump must be connected after the filter in the return pipe to the pool. If an existing heater is being retained, then the Heat Pump should be connected between the filter and the other heater. (See section 3.1).

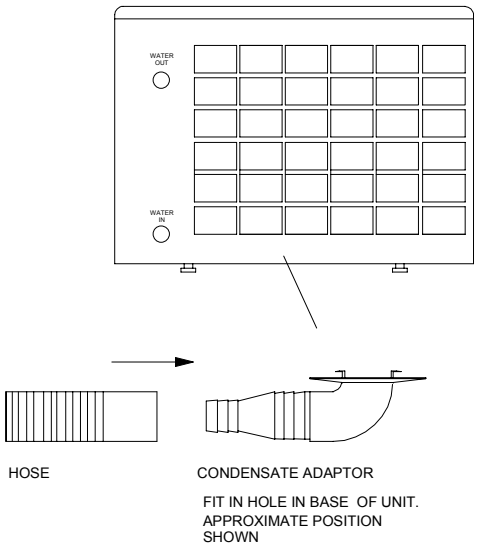
c) Suitable breakable couplings should be installed local to the heat pump.

d) If the heat pump is installed at a lower level than the pool then isolation valves should be fitted.

e) A drain valve or plug should be fitted to the lower pipe to facilitate draining water in the winter period.

f) Connections on all models via by either 1 1/2” or 50mm plastic pipe. The pipes need to be glued into the water in/out connections with a suitable adhesive.

g) The condensate drain in the base of the unit collects condensation from the evaporator fins. This should run away to waste using the flexible drainage tube provided. It is therefore necessary to ensure that the Heat Pump is placed on a level plinth so that the condensate water can run away and not overflow the edges of the drip-tray inside the unit. The position for fitting the condensate adaptor is in the base of the unit. It will be easier to fit this and the hose BEFORE the Compac heat pump is connected to the water supply.



h) When the pipework installation is complete the pool circulation pump should be switched on and the system tested for leaks. Also check the filter gauge to see that there is not an excessive increase in back pressure. If everything is then working normally the water circulating system is ready for use.

i) The water circuit to and from the unit is to be capable of maintaining within specified limits, the rate of flow required by the heat pump. (See section 10).

j) All pipework must be adequately supported with allowance for expansion or contraction especially with plastic pipework.

k) It is recommended that when installing water systems,that the last connections to be made in the system should be breakable connections to avoid any stresses on the unit connections.

IMPORTANT

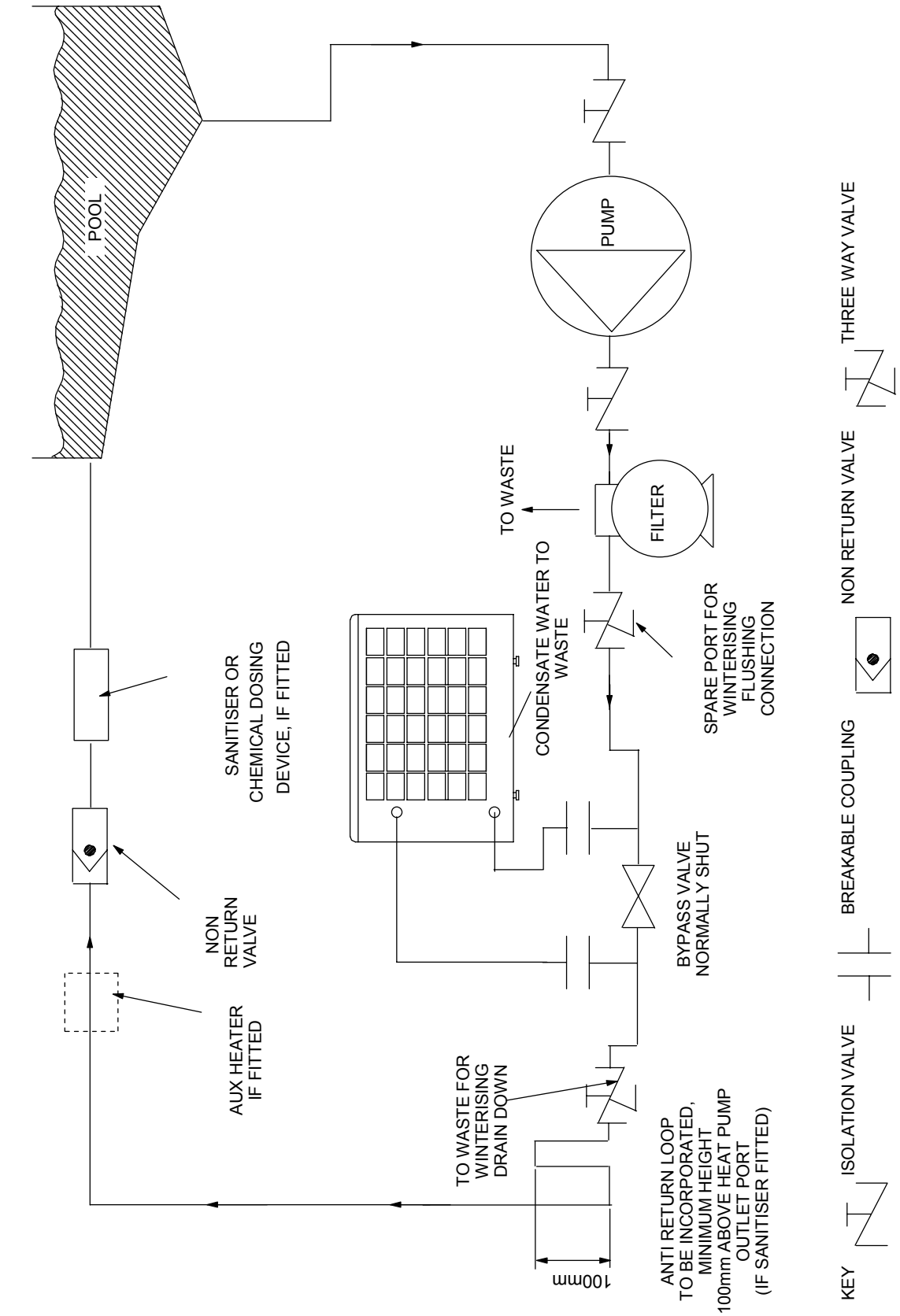
1. All Pool Purifying Devices and Chemical Injection Systems should be fitted down stream of the heat pump (see section 3.1) unless installation is as per filter dosing. This includes the practice of dosing chemicals direct into skimmer basket, which results in concentrated corrosive liquids passing over vulnerable metal components.

Acidity pH	pH	7.2 - 7.8
Total Alkalinity, as $CaCO_3$	ppm	80 - 120
Total Hardness, as $CaCO_3$	ppm	150 - 250
Total Dissolved Solids	ppm	1000 Max
Maximum Salt Content	ppm	35000 Max
Free Chlorine Range	ppm	1 - 2 Domestic
Free Chlorine Range	ppm	3 - 6 Commercial
Superchlorination	max	30ppm for 24 hrs
Bromine	ppm	2 - 5
Baquacil	ppm	25 - 50
Ozone	ppm	0.9 Max
Maximum Copper Content	ppm	1
Aquamatic Ionic Purifier	ppm	2 Max

2. Water quality must be maintained as follows:

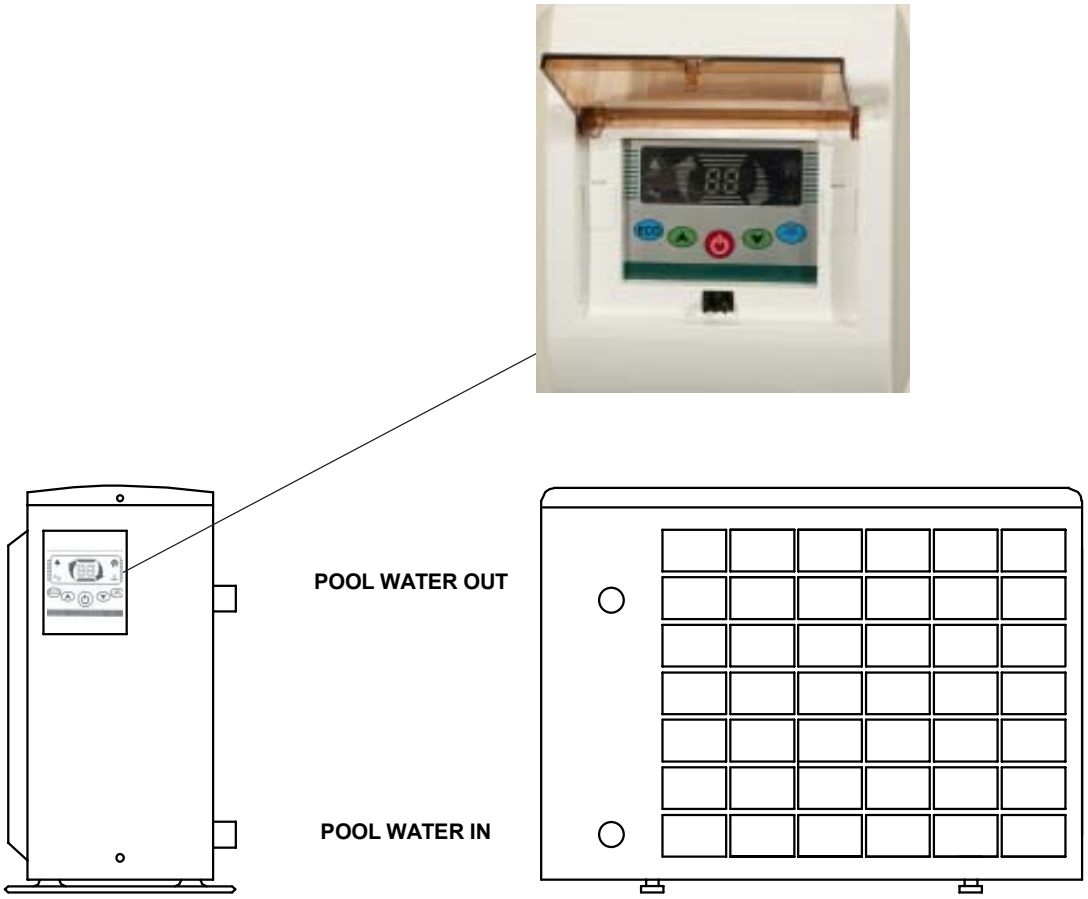
3. Maximum pressure of water in the heat pump circuit should not exceed 3kg/cm (50 psi)

3.1 Recommended Plumbing Schematic



3.2 Determining Water Flow

The heat pump is fitted with a water flow switch which inhibits the operation of the heat pump when the water flow is below 5000L/hour (83L/min). Error E3 on the digital thermostat will be shown until the correct flow rate is achieved. Once this error has disappeared from the thermostat the flow rate is adequate.



HEAP PUMP WATER OUT CONNECTIONS

Flow rate: 5000 to 8000L/hour

4.0 Electrolytic Corrosion in Swimming Pools

Electrolytic corrosion will occur when dissimilar metals that are in contact with each other create a potential difference between themselves. Sometimes separated by a conductive substance known as an electrolyte, the dissimilar metals will create a small voltage (potential difference) that allows the ions of one material to pass to the other.
Just like a battery, ions will pass from the most positive material to the more negative material.

Anything more than 0.3 volts can cause the most positive material to degrade.

A swimming pool with its associated equipment can create this effect. The pool water being an ideal electrolyte and components of the filtration circuit, heating system, steps, lights, etc. providing the dissimilar metals needed to complete the circuit.
Whilst these small voltages are rarely a safety threat, they can create premature failure through corrosion. Not dissimilar to corrosion through oxidation, electrolytic corrosion can cause complete failure of a metallic material in a very short period of time.

In order to prevent this type of corrosion all metallic components in contact with swimming pool water should be bonded together using 10mm² bonding cable. This includes non-electrical items such as metal filters, pump strainer boxes, heat exchangers, steps and hand-rails. It is highly recommended that bonding be retrofitted to existing pools, which may not be protected by this system.

4.1 Electrical (Machine Wiring and Supply).

See section 4.2

All electrical work to be carried out in accordance with I.E.E. standards, latest issue, or local codes of practice as applicable.

The machine should be installed in line with EMC2004/108/EC.

Protected supply to incorporate fuses or motor type circuit breakers (Type C) to specified rating, (see Data Sheet). H.R.C. fuses are recommended. An isolator which disconnects all poles must be fitted within 2m and in sight of machine.†

All units must be correctly earthed-grounded. An earth leakage trip of the Current operating type (30mA) is recommended to be fitted to all pool electrics.

INCONSISTENT ELECTRICAL SUPPLY

The following limits of operation must not be exceeded if machines are to be guaranteed either in performance or warranty terms:

	Minimum	Maximum
Voltage single phase	207V	253V
Frequency - Hz	47,5	52,5

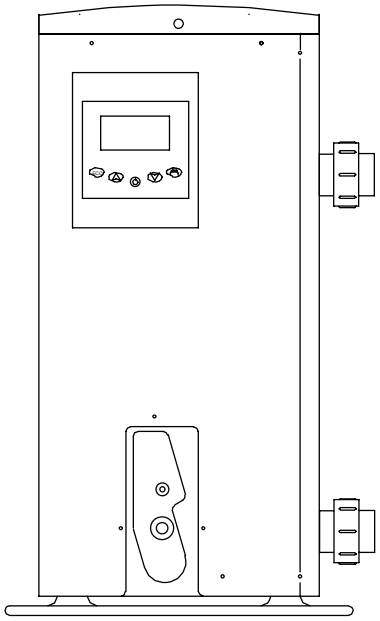
This voltage must be made available at the heat pump while running.

† Note the Isolator must have a minimum of 3mm air gap when turned off.

IMPORTANT

The user should be made aware that THE WHOLE installation should be isolated when working on ANY PART OF THE INSTALLATION

4.2 Location of Mains Input



The Compac heat pump is supplied with 5m of cable which needs to be hard wired to an appropriate MCB (see data sheet).

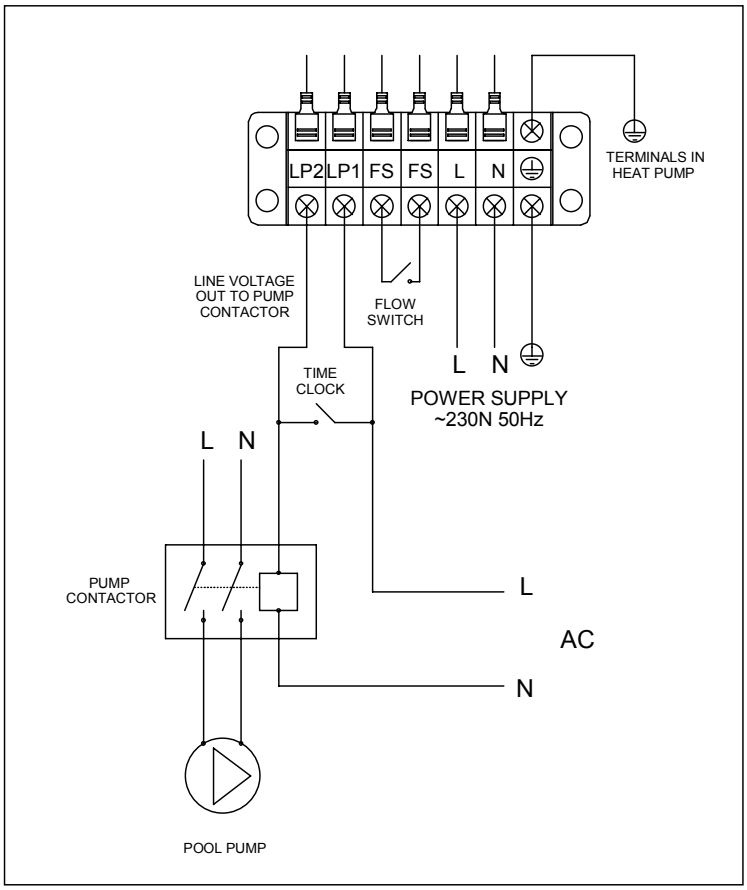
4.3 Pool Pump Synchronisation

For installations where the filter pump, which also provides water to your heat pump, is controlled by a time clock (supplied by the installer) your heat pump can over-ride “pump off” periods set on the time clock so that the filter pump will run if your swimming pool requires heating. By doing so your filter pump will only run when:

a) A block period of pump “running” has been set on the time clock for filtration purposes.

b) The pool requires heating.

This feature operates by overriding the filter pump time clock for three minutes each hour so that water is pumped through the heat pump.
If during this sampling period the heat pump detects a need for water heating it will continue to over-ride the time clock until the swimming pool temperature is satisfied. If water heating is not required, the filter pump will turn off after the three minute sampling period and not restart until the next hourly sampling period or time clock pre set run time. This feature will reduce the filter pump run time and consequently save energy as well as unnecessary filter pump wear and tear.

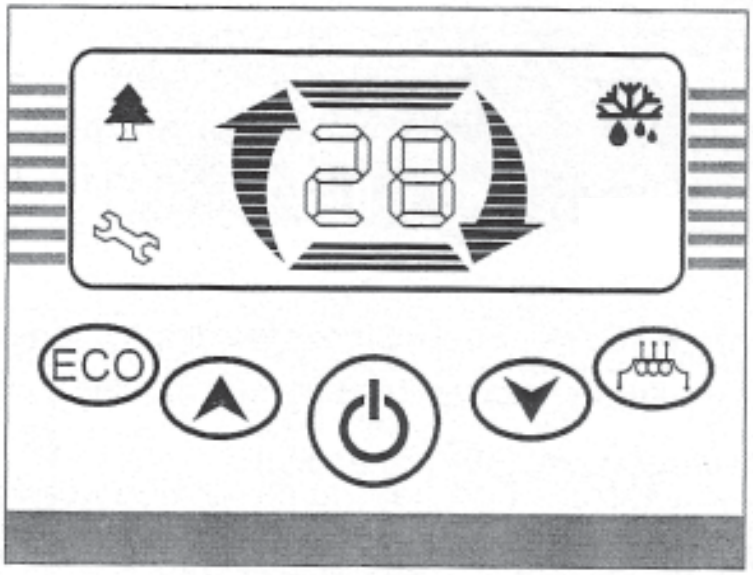


5.0 Controls and indication lamps

CONSOLE

ECONOMY MODE LAMP

FAULT LAMP



DEFROST LAMP

ECO	ECONOMY MODE
	INCREASE TEMPERATURE
	ON/OFF SWITCH
	DECREASE TEMPERATURE
	NOT USED

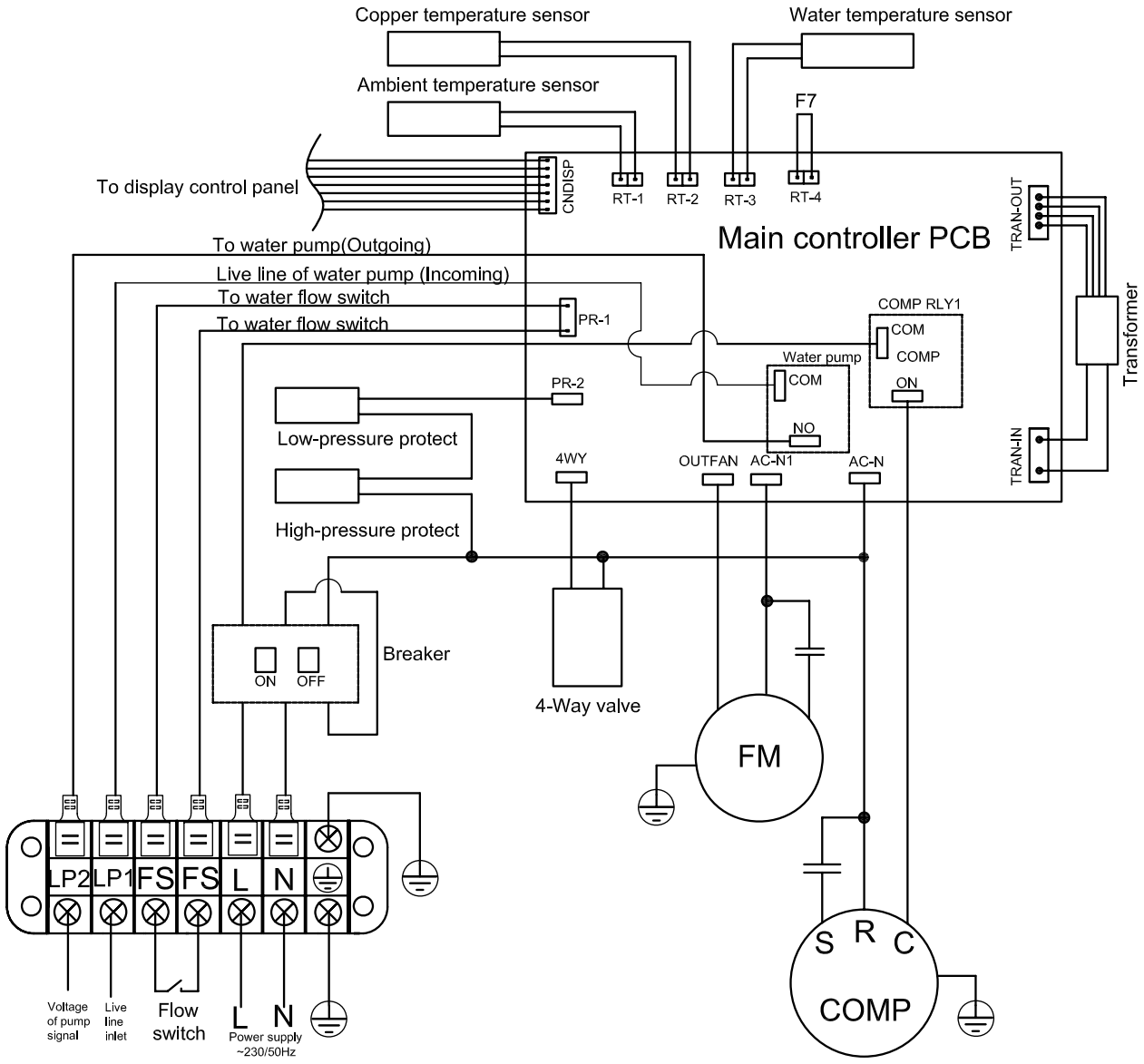
Using the “ECO” button makes the heat pump more economic to run.

When this lamp is illuminated, ECO mode is on.

When the ECO switch is pressed the heat pump will stop working when the ambient temperature is below 5ºC and will restart automatically once the ambient temperature is above 10ºC.

6.0 Circuit Diagram

COM PAC 12 SINGLE PHASE 230V~1N 50Hz



7.0 Regular planned maintenance

Operations to be carried out during a regular planned maintenance visit are as follows:

1. Check and clean the evaporator. (This action may be required more frequently than regular servicing).
2. Check operation of fan and compressor.
3. Check capacitor tolerances - where fitted.
4. Check condition of the water heat exchanger.
5. Check refrigeration system parameters.
6. Check operation of control valves.
7. Check for water leaks.
8. Check driptray and internal drain lines for blockages and clear.
9. Check operation of controls and calibrate if necessary.
10. Check operation of interlocks in use.
11. Final check of overall operation of unit
12. Indicate on Service report any faults found or causes for concern.
13. Recommended servicing frequencies:

    - Light to medium use: one visit per year
    - Heavy use: two visits per year

8.0 Heat Pump Malfunction

WARNING: Isolate heat pump electrically before entering heat pump or removing panels.

The user check list should be carried out before initiating a service call. Do not attempt to interfere with any internal control settings as these have been factory calibrated and sealed.
Any sign of abnormal operation such as water dripping should be reported immediately to an installer. If in doubt or if advice is required contact the Service Department.
Telephone +44 (0)1621 857171

8.1 User Check List

The digital thermostat will display one of the following error codes in the event of a heat pump malfunction.

E1 The water temperature probe is not working correctly, contact dealer.

E2 The condenser temperature sensor is not working correctly, contact dealer.

E3 Water flow through heat pump is inad-equate, check pool water ciruit for blockages.

E4 Indicates high or low pressure trip, contact dealer.

E5 There is a refrigerant leakage, contact dealer.

9.0 Datasheet

MODEL	**Units**	**COMPAC12**
HEAT TO POOL WATER		
AMBIENT 20°C, WATER 27°C	kWh	11.6
ELECTRICITY		
ELECTRICAL SUPPLY 1 PHASE		230V/~1N/ 50Hz
TOTAL POWER CONSUMED		
AMBIENT 20°C, WATER 27°C	kWh	2.56
MIN SUPPLY CAPACITY (Max F.L.A.) 1 ph N:-	A	11.8
RECOMMENDED SUPPLY FUSE 1 ph N:-	A	20.0
WATER FLOWS ETC		
POOL WATER FLOW RATE:-	L/min	133
MAX WORKING PRESSURE POOL WATER:-	bar	4
POOL WATER CONNECTIONS:-	inches	1 1/2" FEMALE or 50mm
POOL WATER FLOW RATE:-	L/h	5000-8000
CONDENSATE DRAIN CONNECTIONS:-	mm	15
MAIN FAN		
AIR FLOW (Anemometer @ air on grille. Dry evaporator):-	m^3/h	1600
GENERAL DATA		
HERMETIC SYSTEM		
GAS CHARGE R410a	kg	1.4
PHYSICAL DIMENSIONS		
WIDTH (Unpacked):-	mm	848
DEPTH (Unpacked):-	mm	300
HEIGHT (Unpacked):-	mm	630
WEIGHT (Unpacked):-	kg	63
WIDTH (Packed):-	mm	980
DEPTH (Packed):-	mm	395
HEIGHT (Packed):-	mm	700
WEIGHT (Packed):-	kg	66
SOUND LEVEL	dBA	52

FOR ACCURATE APPLICATION SIZING CONSULT SUPPLIER

NOTES

1) Weight and dimensions nett.

2) Performance design limitations: Ambient = 5ºC min 40ºC max, Water = 15ºC min, 35ºC max.

3) Pool w ater to have correct balance, pH 7.2-7.8, Free Chlorine 1.0 - 2.0ppm domestic, 3.0 - 6.0 commercial.

4) Allow 500mm clearance to service panels.

5) Compac heat pumps reserve the right to change or modify models w ithout prior notice.

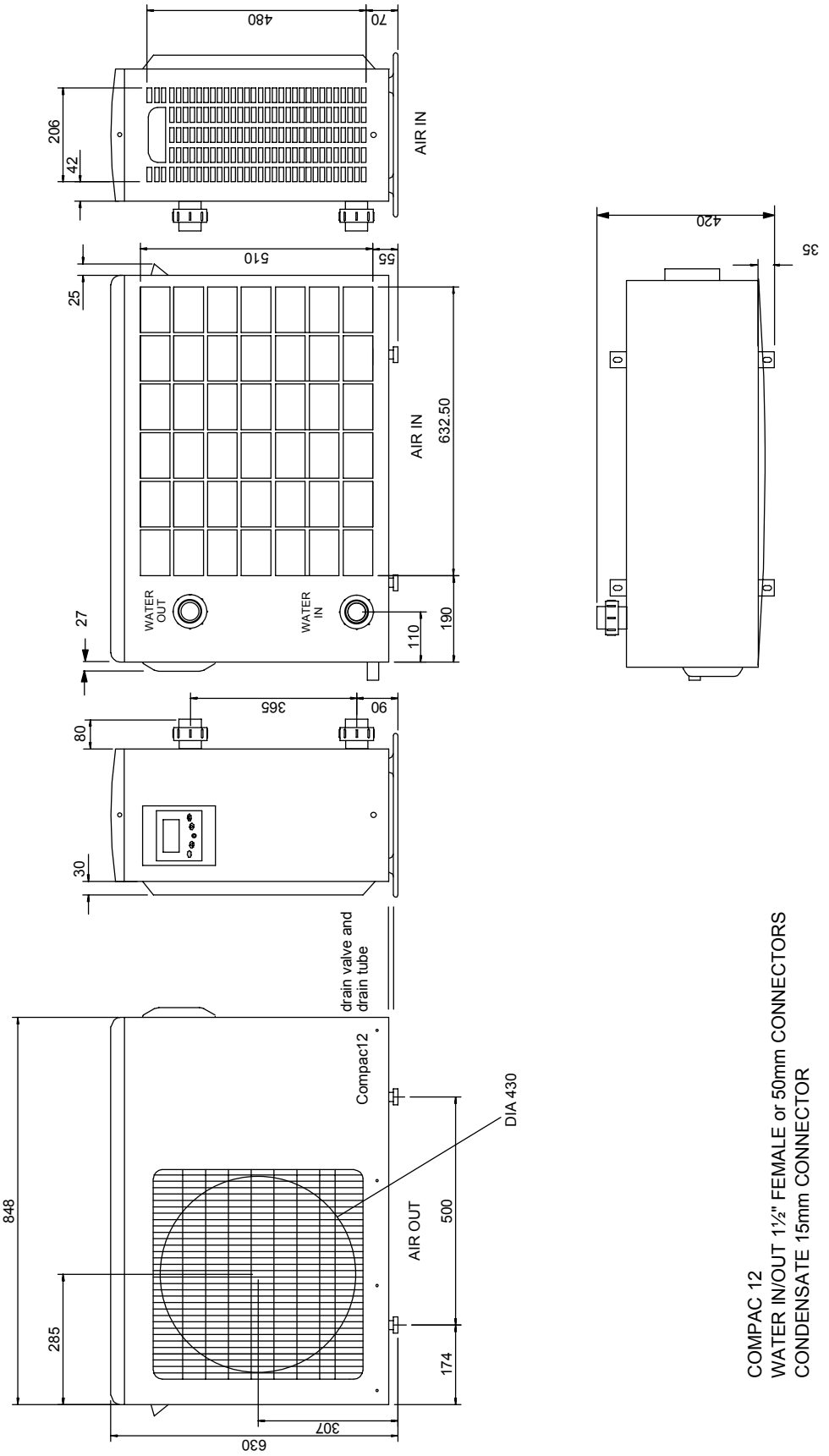
6) R410a Global w arming potential (GWP) 1997.

1mm WG = 9.8 Pa

1mhd = 1.4 psi

1l/min = 0.22gall/min

10.0 Installation Drawings



COMPAC 12
WATER IN/OUT 1½" FEMALE or 50mm CONNECTORS
CONDENSATE 15mm CONNECTOR

11.0 Winterisation Procedure

WARNING. Isolate machine before removing covers!

The heat pump embodies electrical and rotational equipment, it is recommended for your own safety that a competent person carries out the following procedure.

ALL MODELS

Objective

To provide frost protection

To eliminate corrosion problems

To inhibit electrical components

1. Switch off the electric supply to the heat pump.
2. Remove external fuses and keep in safe place away from heat pump to prevent accidental operation of heat pump.
3. Ensure that the water circulation pump is switched off.
4. Drain water from heat pump by:

a. drain valve if fitted

b. disconnecting pipework to and from heat pump

5. Flush through water circuit in heat pump by using CLEAN TAP WATER (NOT POOL WATER) via hose into outlet connection - run the hose for 10 minutes minimum; use spray nozzle if available.
6. Allow to drain - when drained, fit plastic bags secured by elastic bands over water connections.
7. Uncover electrical enclosure (see section 4.2) and liberally spray interior of unit, with moisture-repellant aerosol WD40 or similar; reseal enclosure.
8. If the heat pump is located outside, protect from weather by covering with VENTILATED cover. Do not use plastic sheet as condensation could occur within the unit.

IMPORTANT

If this procedure is not adopted and frost or corrosion damage results then the warranty will become invalid.

11.1 Start up Procedure After Winterisation

1. Replace covers (if not fitted).
2. Remove front grille, using a soft brush clean the finned surfaces of evaporator. Replace panel.
3. Remove plastic covers on water connections and reconnect water piping or close drain valve.
4. Start up water circulating pump and leave running for at least 1/4 hour to establish flow and enable an air in piping to escape.
5. Replace fuses to heat pump circuit.
6. Switch on heat pump.
7. Check control thermostat is set to required pool temperature.
8. Check pool water daily to ensure it is at correct pH and has correct chemical balance. See Section 3 Plumbing.

12.0 Warranty Conditions

The following exclusions apply to the Warranty given by Calorex Heat Pumps Ltd. No claims will be accepted if : -

1. The heat pump is incorrectly sized for the application.
2. The heat pump is installed in any way that is not in accordance with the current procedures as defined by Calorex Heat Pumps Ltd.
3. The heat pump has been worked upon or is adjusted by anyone other than a person authorised to do so by Calorex Heat Pumps Ltd.
4. The air flow to and from the machine is outside the specified limits.
5. The water flow through the machine is outside the specified limits.
6. The water pH level and/or chemical balance is outside the following limits:-

Acidity pH	pH	7.2 - 7.8
Total Alkalinity, as $CaCO_3$	ppm	80 - 120
Total Hardness, as $CaCO_3$	ppm	150 - 250
Total Dissolved Solids	ppm	1000
Maximum Salt Content	ppm	35,000
Free Chlorine Range	ppm	1 - 2 Domestic
Free Chlorine Range	ppm	3 - 6 Commercial
Superchlorination	max	30ppm for 24 hrs
Bromine	ppm	2 - 5
Baquacil	ppm	25 - 50
Ozone	ppm	0.9 Max
Maximum Copper Content	ppm	1
Aquamatic Ionic Purifier	ppm	2 Max

7. The heat pump has suffered frost damage.
8. The electrical supply is insufficient or in anyway incorrect.

12.1 Service Contact

Service Phone Number +44 (0)1621 857171